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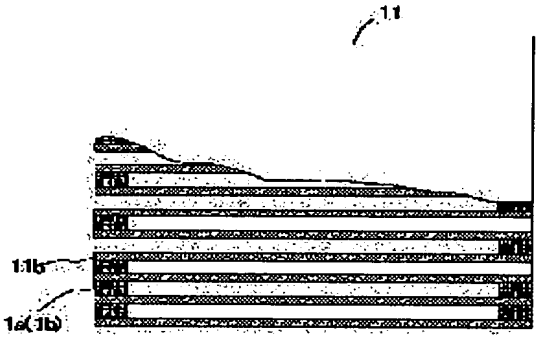
(54) CERAMIC HONEYCOMB FILTER

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a ceramic honeycomb filter capable of removing fine particles at the time of regeneration with high efficiency and having a low pressure loss.
SOLUTION: In the ceramic honeycomb filter for removing fine particles contained in exhaust gas by sealing the end parts of predetermined flow channels of a ceramic honeycomb structure and passing the exhaust gas through the porous partition walls demarcating the flow channels, both end parts of the flow channels in the vicinity of the outer peripheral wall of the ceramic honeycomb structure are sealed by a sealant and the length of the sealant from the end surface of the filter is 8.2% or less of the total length of the ceramic honeycomb filter. The flow channels sealed at both ends thereof are present within a range of the maximum 5×(partition wall pitch) length toward the center of the end surface of the honeycomb filter from the outer peripheral wall of the end surface of the honeycomb filter.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] By carrying out eye closure of the predetermined passage edge of a ceramic honeycomb structure object, and making the septum of the porosity which divides this passage pass exhaust gas In the ceramic honeycomb filter from which the particle contained in exhaust gas is removed In both ends, eye closure of the passage near the peripheral wall is carried out with an eye sealing agent, and the die length from the filter end face of said eye sealing agent is 8.2% or less of the overall length of a ceramic honeycomb filter. And the passage where eye closure of said ends is carried out is a ceramic honeycomb filter characterized by being the passage which exists in the range of the die length of a maximum of 5 x (septum pitch) toward the core of a honeycomb filter end face from the peripheral wall of a honeycomb filter end face.
[Claim 2] The ceramic honeycomb filter according to claim 1 characterized by the die length from the end face of the eye sealing agent which carried out eye closure of the passage near [said] the peripheral wall at both ends being 3.3% or less of the overall length of a ceramic honeycomb filter.
[Claim 3] The passage near [where eye closure of said ends is carried out] the peripheral wall is a ceramic honeycomb filter according to claim 1 to 2 characterized by being the passage which exists in the range of the die length of a maximum of 3 x (septum pitch) toward the core of a honeycomb filter end face from the peripheral wall of a honeycomb filter end face.
[Claim 4] The peripheral wall of said ceramic honeycomb filter is a ceramic honeycomb filter according to claim 1 to 3 which thickness is 0.3-2.0mm and is characterized by consisting of a cordierite particle and colloidal silica which exists among them.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the ceramic honeycomb structure object which removes a particle from the exhaust gas discharged from a diesel power plant.
[0002]
[Description of the Prior Art] The cutback of the harmful matter contained in the exhaust gas discharged from engines, such as an automobile, from the maintenance side of a local environment or earth environment is called for, and in order to remove the particle contained in the exhaust gas from a diesel power plant, the ceramic honeycomb filter which consists of a honeycomb structure object which is an inflow [of exhaust gas] or runoff side, and carried out eye closure of the predetermined penetration hole edge section of a honeycomb structure object by turns is used especially recently.
[0003] Drawing 1 is the type section schematic diagram of an important section showing an example of the example of an activity of the ceramic honeycomb filter which catches the particle, especially graphite particle in exhaust gas. Usually, the configuration of the end-face periphery of the ceramic honeycomb filter 11 is an approximate circle configuration, it has two or more passage 11c formed of septum 11b which intersects perpendicularly with the inner circumference side of that peripheral-wall 11a and this peripheral-wall 11a respectively, and the both ends of this passage 11c are closed by turns by inflow side sealing agent 1a and runoff side sealing agent 1b. As shown in drawing 1 , sticking-by-pressure grasping is carried out through the supporter material 14 into the metal stowage container 12, and this ceramic honeycomb filter 11 is pinched in the direction of a breakthrough through the supporter material 13, and is contained. Here, although supporter material is generally formed on the mat made from a metal mesh or the ceramics, it is used together according to a service condition. The exhaust gas cleaning effect in the ceramic honeycomb filter of such structure is performed as follows. First, as it flows from passage 11c which is carrying out opening of the inflow side edge side of the ceramic honeycomb filter 11 contained by the stowage container 12 and an arrow head shows, inflow side exhaust gas 2a passes septum 11b, and is exhausted as runoff side exhaust gas 2b. In case inflow side exhaust gas 2a passes septum 11b, the particle contained in inflow side exhaust gas 2a is caught by septum 11b, and the purified exhaust gas is emitted into atmospheric air as runoff side exhaust gas 2b. Since the blinding of a filter will generate the particle caught by septum 11b if it becomes more than a constant rate, it is made to burn by the burner or the electric heater, and playback of a filter is performed.
[0004] In order to solve philharmonic's ceramic honeycomb chip and the problem of a crack which are produced with the bolting pressure from the supporter material for containing an above-mentioned ceramic honeycomb filter in a metal stowage container, in JP,1-47206,B, the ceramic honeycomb filter which has improved reinforcement is indicated by filling up with a filler the fluid channel of the periphery edge of the ceramic honeycomb filter of the location where supporter material contacts, or filling up the opening end-face section with a filler. Moreover, in JP,63-2887,B, the opening end-face closure approach which closes the breakthrough of the position in an open end with a specific ceramic ingredient, and closes the breakthrough of the opening end face near the peripheral wall by one [at least] end face is indicated.
[0005] On the other hand, stripping of the heat of combustion of a particle is protected from the metal stowage container 12 in the case of filter playback, the both ends of each passage which exists in the periphery section are ******(ed) with an eye sealing agent the making filter playback perform good object to JP,60-159813,U, JP,62-105320,U, JP,63-28820,U, JP,64-12614,U, and JP,5-118211,A, and the technique which makes this passage incubation space is indicated.
[0006]

[Problem(s) to be Solved by the Invention] However, there was a trouble as shown below by the opening end-face closure approach currently indicated by the above-mentioned Prior art. Although the thermal conductivity of the periphery edge of a ceramic honeycomb filter becomes good since the fluid channel of the ceramic honeycomb filter periphery edge of the location where supporter material contacts is filled up with JP,1-47206,B with the filler Since the peripheral wall has structure which contacts a metal container and is easy to be cooled through supporter material, In case the particle in exhaust gas is burned, heat of combustion tends to get across to a metal container through a filler and a peripheral wall. The temperature gradient of the center of filter section and the periphery section became large too much, it became imperfect in causing the crack of a filter by the thermal strain combustion removing [of the particle in the periphery section] it, and it was not desirable from a viewpoint of endurance or practicability. In JP,63-28875,B, moreover, the die length of the eye sealing agent which is closing the opening end face near the peripheral wall for a periphery section consolidation According to drawing 4, are about 10% of the overall length of a honeycomb structure object, and a honeycomb structure object with an overall length of 152mm is received also in the example. The die length of the eye closure section is 15-25mm (16.4% [9.9% -] of overall-length comparison). Since the heat of combustion at the time of the die length of the closure section burning the particle in exhaust gas from a ******** relatively to an overall length becomes that stripping is easy to be carried out to a metal container through this closure section, The temperature gradient of the center of filter section and the periphery section became large too much, it became imperfect in causing the crack of a filter by the thermal strain combustion removing [of the particle in the periphery section] it, and it was not desirable from a viewpoint of endurance or practicability. Moreover, JP,60-159813,U, JP,62-105320,U, With the technique which ****** the both ends of each passage which exists in the periphery section indicated by JP,63-28820,U and JP,64-12614,U with an eye sealing agent, and makes this passage incubation space Since it is unstated in any way about the length of an eye sealing agent, like a JP,63-28875,B official report In stripping, the heat energy at the time of burning the particle in exhaust gas became is easy to be carried out to a metal container through the eye closure section, the crack of a filter was caused and there was a case where combustion clearance of the particle in the periphery section became imperfect. Moreover, about the number of the passage where eye closure of the ends was carried out near the periphery, since it was unstated in any way, and the passage which has a filtering function decreased in number substantially and the pressure loss of a filter went up, the problem that an engine performance fell might be generated. moreover, with the filter made into 10 - 20%, ****** which shows the rate to the total cross section of the cross section of the heat insulation section by which eye closure was carried out in ends indicated by JP,5-118211,A Although the thermal diffusion to the metal container from the filter periphery section can be prevented to be sure and the combustion clearance of the particle can be carried out efficiently Since the passage where it has a filtering function since ****** is as high as 10 - 20% decreased in number substantially and the pressure loss of a filter went up, there was a problem that an engine performance fell. As mentioned above, in the Prior art, although the heat insulation property of passage that eye closure of the ends [/ near the peripheral wall] was carried out was used, it was difficult to obtain the filter which the particle clearance at the time of playback could carry [filter] out with the well head, and moreover reconciled the two properties of low voltage force loss.

[0007] The object of this invention was made in view of the above-mentioned technical problem, and the particle clearance at the time of playback can perform it with a well head, and it is to offer the ceramic honeycomb filter which has the property of low voltage force loss.

[0008]

[Means for Solving the Problem] As a result of inquiring wholeheartedly paying attention to adiathermic [of the passage near the peripheral wall of a ceramic honeycomb filter], and the particle uptake property of a septum, this invention persons acquired knowledge that the above-mentioned technical problem is solvable, and hit on an idea to this invention. Namely, the ceramic honeycomb filter of this invention By carrying out eye closure of the predetermined passage edge of a ceramic honeycomb structure object, and making the septum of the porosity which divides this passage pass exhaust gas In the ceramic honeycomb filter from which the particle contained in exhaust gas is removed In both ends, eye closure of the passage near the peripheral wall is carried out with an eye sealing agent, and the die length from the filter end face of said eye sealing agent is 8.2% or less of the overall length of a ceramic honeycomb filter. And passage where eye closure of said ends is carried out is characterized by being the passage which exists in the range of the die length of a maximum of 5 x (septum pitch) toward the core of a honeycomb filter end face from the peripheral wall of a honeycomb filter end face. At this time, it is suitable for the die length from the end face of the eye sealing agent which carried out eye closure of the passage near [said] the peripheral wall at both

ends that it is 3.3% or less of the overall length of a ceramic honeycomb filter. Moreover, it is suitable for the passage near [where eye closure of said ends is carried out] the peripheral wall that it is the passage which exists in the range of the die length of a maximum of 3 x (septum pitch) toward the core of a honeycomb filter end face from the peripheral wall of a honeycomb filter end face. Moreover, thickness is 0.3-2.0mm and it is suitable for the peripheral wall of said ceramic honeycomb filter to consist of a cordierite particle and colloidal silica which exists among them.

[0009]

[Function] The operation effectiveness in this invention is explained. In both ends, eye closure of the passage near the peripheral wall is carried out with an eye sealing agent by the ceramic honeycomb filter of this invention, and 8.2% or less and said ends of the overall length of a ceramic honeycomb filter make die length from the end face of said eye sealing agent the passage where the passage by which eye closure is carried out exists in the range of the die length of a maximum of 5 x (septum pitch) toward the core of a honeycomb filter end face from the peripheral wall of a honeycomb filter end face. For this reason, from a filter peripheral wall, there is no heat leakage of a metal container, the combustion clearance of the particle by which uptake was carried out can be carried out efficiently, and it excels in the filter regeneration rate. Furthermore, the pressure loss of a filter can be pressed down to the minimum, and engine performance degradation is not caused. That is, since the die length of the end face of the eye sealing agent which is carrying out eye closure of the both ends of passage is made into 8.2% or less of the filter overall length, it becomes possible to press down to extent which can disregard stripping to the metal container through the eye sealing agent of the heat of combustion at the time of particle combustion. If the die length of the end face of an eye sealing agent exceeds 8.2% of a filter overall length here, the cinder of ******** by which it becomes impossible to have disregarded stripping to the metal container through the eye sealing agent of the heat of combustion at the time of particle combustion, and uptake was carried out will arise, and a filter regeneration rate will fall. Moreover, since the passage where eye closure of the ends is carried out is considering as the passage which exists in the range of the die length of a maximum of 5 x (septum pitch) toward the core of a honeycomb filter end face from the peripheral wall of a honeycomb filter end face, the pressure loss of a filter can be pressed down to the minimum. If the passage where eye closure of the ends is carried out here crosses the range of the die length of a maximum of 5 x (septum pitch) toward the core of a honeycomb filter end face from the peripheral wall of a honeycomb filter end face, since the rate of a septum of having a filtering function relatively decreases and the pressure loss of a filter will go up, engine exhaust gas pressure goes up and engine performance degradation is caused.

[0010] Furthermore, when the die length from the end face of the eye sealing agent which carried out eye closure of the passage near the peripheral wall at both ends carries out to 3.3% or less of the overall length of a ceramic honeycomb filter, the effectiveness which the passage near the periphery section commits as a heat insulation air space becomes large, the combustion clearance of the particle by which the heat leakage of a metal container decreased further and uptake was carried out from the filter peripheral wall can be carried out efficiently, and a filter regeneration rate comes to be further excellent.

[0011] Moreover, since the pressure loss of a filter can be further reduced by supposing that it is the passage near [where eye closure of said ends is carried out] the peripheral wall the passage which exists in the range of a maximum of 3 x (septum pitch) toward the core of a honeycomb filter end face from the peripheral wall of a honeycomb filter end face, engine exhaust gas pressure falls and an engine performance improves further.

[0012] Moreover, the peripheral wall of a ceramic honeycomb filter is because the adiabatic efficiency of the passage near [by which eye closure was carried out in the ends side in this peripheral wall] the peripheral wall becomes much more effective as for it being suitable that thickness is 0.3-2.0mm and consists of a cordierite particle and colloidal silica which exists among them. When 2.0mm is exceeded, and a thermal shock joins a filter, the crack of a peripheral wall occurs, and since adiabatic efficiency is not acquired by less than 0.3mm in **** again, the range of 0.3-2mm is desirable, although the thicker one of the thickness of a peripheral wall is desirable from adiathermic. Moreover, it is because will compare when the peripheral wall consists of cordierite ceramic independent one, and the continuity of the cordierite in a peripheral wall will be spoiled, if the peripheral wall consists of a cordierite particle and colloidal silica which exists among them, so heat cannot be transmitted easily and the adiabatic efficiency in a peripheral wall is improved further. Here, using a cordierite particle has a small coefficient of thermal expansion, it is because it is advantageous to a heat-resistant impact, and is baking powder which generally has the mean particle diameter of 50 micrometers or less. Moreover, colloidal silica is used for forming the peripheral wall which combines a cordierite particle and has thermal resistance. To a peripheral wall, ceramic fiber,

water glass, alumina cement, a colloidal alumina, etc. may be suitably added in the range which spoils neither thermal resistance nor reinforcement besides the above-mentioned cordierite particle and colloidal silica.

[0013]

[0014]

[Embodiment of the Invention] Hereafter, the gestalt of operation explains this invention. The mimetic diagram of the end face of the ceramic honeycomb filter by this invention is shown in drawing 2 . Moreover, the cross section of the direction of passage of the ceramic honeycomb filter by this invention is shown in drawing 3 . An imaginary line 15 shows a profile only with the small die length of 2x (septum pitch) toward an end-face core to a peripheral wall, and eye closure of the passage which exists between an imaginary line 15 and a peripheral wall is carried out at both ends. After the restoration to the passage of an eye sealing agent prepares a well-known technique, for example, an eye sealing agent slurry, here, The predetermined open end by the side of the end in the passage of a honeycomb structure object is blockaded with the mask made of resin. After it dips a slurry so that the predetermined depth may be obtained at the end side of the honeycomb structure object concerned, and a slurry dries, the mask made of resin is removed and it is carried out by calcinating an eye sealing agent further. The eye closure die length of the passage by which the gestalt of operation here of this invention is not limited to drawing 2 thru/or the configuration of 3, and eye closure was carried out at both ends is the range which does not exceed 8.2% of the overall length of a ceramic honeycomb filter. And if the passage where eye closure of said ends is carried out is passage which exists in the range of the die length of a maximum of 5 x (septum pitch) toward the core of a honeycomb filter end face from the peripheral wall of a honeycomb filter end face Since the passage by which eye closure was carried out commits ends as a heat insulation air space near the peripheral wall also in the configuration of other examples of invention shown in drawing 4 , while there is no heat leakage of a metal container and being able to carry out the combustion clearance of the particle by which uptake was carried out efficiently from a filter peripheral wall Since the pressure loss of a filter can be pressed down to the minimum, engine performance degradation can be prevented.

[0015] Moreover, since this invention is aimed at the exhaust gas discharged mainly from a diesel power plant as an ingredient which constitutes the ceramic honeycomb filter of this invention, it is desirable to use a heat-resistant good ingredient. For this reason, although it is desirable to use the ceramic ingredient which makes cordierite, a mullite, an alumina, silicon nitride, silicon carbide, LAS, etc. the main crystal phase, the ceramic honeycomb filter which makes cordierite the main crystal phase especially is excellent in thermal resistance, and since it is chemically stable, it is the most desirable [it is cheap, and].

[0016] Moreover, not to mention being applicable to a mutual playback system, as the conventional technique showed the ceramic honeycomb filter of this invention, it cannot be overemphasized that it is applicable to the ceramic honeycomb filter of the continuation playback type which burns a particle continuously with combination with a precious metal catalyst.

[0017] (Example 1) After mixing and kneading the cordierite-ized raw material and fabricating a honeycomb structure object by the well-known extrusion method, it calcinated at 1400 degrees C and the outer diameter of 267mm, die length of 305mm, and the thickness of a septum acquired 0.3mm and the nature of cordierite ceramic honeycomb baking object whose thickness of 1.47mm and a peripheral wall the pitch of a septum is 1.5mm. Subsequently, while eye closure was made by turns in the passage edge of a ceramic honeycomb structure object, with the well-known technique, after being filled up with the eye sealing agent slurry which consists of a cordierite-ized raw material, desiccation of an eye sealing agent slurry and baking were performed, and various nature of cordierite ceramic honeycomb filters were obtained so that eye closure of the both ends might be carried out to the passage near the peripheral wall. Under the present circumstances, the restoration conditions of an eye closure slurry were adjusted so that the various range in the various die length and the end face of an eye sealing agent by which eye closure was carried out in the ends near the periphery section might be obtained. After making the particle discharged from a diesel power plant catch to these ceramic honeycomb filters, the mass regeneration rate after carrying out combustion clearance of the particle, and assessment of pressure loss were performed. A result is shown in a table 1. In a table 1, the eye closure die-length ratio of the both-ends eye closure section is a x(die length from end face of eye sealing agent which carried out eye closure of passage near peripheral wall at both ends)100/(overall length of a filter) thing, and a filter overall length is 305mm in this example. Moreover, the range where the passage where eye closure of the ends was carried out exists is indicated to be the range of the ends eye closure section in an end face by the die length which goes to a core from the peripheral wall in an end face.

[0018] A mass regeneration rate shows the thing of x(amount of cinders after amount of prehension-playback)100/(amount of prehension) (%) here. The test result considered the case where a mass regeneration rate was 80% or more as acceptance (O), made (O) 90 more% or more of desirable case, and showed less than 80% of case by rejection (x). On the other hand, pressure loss evaluated by pressure loss honeycomb filter inflow before at the time of 7.5Nm3/min of air flow rates, and after runoff in the pressure loss test stand, when it was the pressure loss of 250 or less mmAqs, it was considered as acceptance (O), it is (O), and when it was the pressure loss exceeding 250mmAq, in the case of 200 or less still more desirable mmAqs, it was made into the rejection, and (x) showed it. And both a mass regeneration rate and pressure loss evaluated by (x) what has (x) in (O) and either in some (O), among those whose both are (O) about what is acceptance as a comprehensive judgment.
[0019] Trial NO.1-5 among the results shown in a table 1 It is an example of this invention and the die length of the eye sealing agent which carried out eye closure of the passage near the periphery section at both ends is 8.2% or less of a ceramic honeycomb filter overall length. Since the passage near [where eye closure of the ends is carried out] the peripheral wall was within the limits of a maximum of 5 x (septum pitch) toward the core of an end face from the peripheral wall of a honeycomb filter end face, a mass regeneration rate and pressure loss passed by (O) or (O), and each comprehensive judgment was acceptance. The die length of the eye sealing agent which carried out eye closure of the passage near the periphery section at both ends was 3.3% or less of a ceramic honeycomb filter overall length, since the passage near [where eye closure of the ends is carried out] the peripheral wall was the more desirable range of the range of a maximum of 3 x (septum pitch) toward the core of an end face from the peripheral wall of a honeycomb filter end face, a mass regeneration rate and pressure loss were the (O) judgings, and especially trial NO.4 were a comprehensive judgment (O). Trial NO.6-8 were the example of a comparison of this invention, since the die length of the eye sealing agent which carried out eye closure of the passage near the periphery section at both ends was over 8.2% of the ceramic honeycomb filter overall length, stripping of the heat of combustion which minds this eye sealing agent at the time of particle combustion became large, the judgment of a mass regeneration rate became rejection (x), and the comprehensive judgment was (x). Moreover, the passage near [where trial NO.9 are the example of a comparison of this invention, and eye closure of the ends is carried out] the peripheral wall Although the adiabatic efficiency by the passage by which eye closure was carried out in the ends near the peripheral wall became large and the judgment of a mass regeneration rate was (O) since it existed also in the field which exceeded the range of a maximum of 5 x (septum pitch) toward the core of an end face from the peripheral wall of a honeycomb filter end face Since the number of the passage which has a filtering function decreased substantially, the judgment of pressure loss became rejection (x) and the comprehensive judgment was rejection (x). Furthermore, although trial NO.10 were the example of a comparison of this invention and it was the example of the filter which does not have the passage by which eye closure was carried out in both ends near the peripheral wall, since the adiabatic efficiency by the passage near the peripheral wall was not acquired, the judgment of a mass regeneration rate became rejection (x), and the comprehensive judgment was rejection (x).
[0020] (Example 2) By the same approach as an example 1, after mixing and kneading the cordierite-ized raw material and fabricating a honeycomb structure object by the well-known extrusion method, eye closure was performed to the predetermined passage of both ends, it calcinated at 1400 degrees C, and the ceramic honeycomb baking object was acquired. Then, processing removed the periphery section of this baking object, 10 mass ****** and the nature slurry of cordierite which added and adjusted a binder, water, etc. further were applied to the peripheral face after processing for colloidal silica to the cordierite aggregate 100 mass section of 15 micrometers of mean diameters, and the peripheral wall was formed. then, trial NO. of a table 1 whose thickness of 1.47mm and a peripheral wall desiccation of a peripheral wall and baking are performed and the pitch of 0.3mm and a septum is 1.5mm for the outer diameter of 267mm, die length of 305mm, and the thickness of a septum -- the nature of cordierite ceramic honeycomb filter shown in 11 and 12 was obtained. The result of having performed assessment of the same mass regeneration rate as an example 1 and pressure loss to these is shown in a table 1. 11 and 12 are the examples of this invention, and the die length of the eye sealing agent which carried out eye closure of the passage near the periphery section at both ends is 8.2% or less of a ceramic honeycomb filter overall length. trial NO. -- Since the passage near [where eye closure of the ends is carried out] the peripheral wall was within the limits of a maximum of 5 x (septum pitch) toward the core of an end face from the peripheral wall of a honeycomb filter end face, a mass regeneration rate and pressure loss passed by (O) or (O), and each comprehensive judgment was acceptance.
[0021]

[A table 1]

試験NO		外周壁近傍の両端目封止流路	両端目封止部の目封止長さ比 (%)	端面における両端目封止部の範囲	評価結果		
					質量再生率	圧力損失	総合判定
1	本発明例	有り	8	4×(隔壁ピッチ)	○	○	○
2		有り	5	4×(隔壁ピッチ)	○	○	○
3		有り	3	4×(隔壁ピッチ)	◎	○	○
4		有り	3	2×(隔壁ピッチ)	◎	◎	◎
5		有り	5	2×(隔壁ピッチ)	◎	◎	○
6	比較例	有り	12	2×(隔壁ピッチ)	×	◎	×
7		有り	15	2×(隔壁ピッチ)	×	◎	×
8		有り	50	2×(隔壁ピッチ)	×	◎	×
9		有り	3	7×(隔壁ピッチ)	◎	×	×
10		無し	−	−	×	◎	×
11	本発明例	有り	3	2×(隔壁ピッチ)	◎	◎	◎
12		有り	5	2×(隔壁ピッチ)	◎	◎	○

[0022] As mentioned above, although explained based on the gestalt and examples 1-2 of operation about this invention, this invention is not limited to the above-mentioned example of invention, but can be applied in the range of technical thought. For example, even if the periphery configuration of a ceramic honeycomb structure object is not circular, it is applicable to other configurations, such as an ellipse.

[0023]

[Effect of the Invention] Since the passage where the ceramic honeycomb filter of this invention carried out eye closure of the ends with the eye sealing agent near the peripheral wall of a filter as explanation in a detail is prepared above and the existing range in the die length of this eye sealing agent and an end face is moreover specified in the detail, there is almost no heat dissipation from the filter periphery section, the combustion clearance of the particle by which uptake was carried out can be carried out efficiently, and the reproducing characteristics of a filter are excellent. Furthermore, the pressure loss of a filter can be pressed down to the minimum, and engine performance degradation can be prevented.

[Translation done.]

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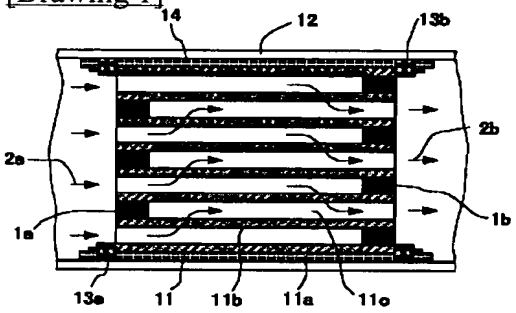
DRAWINGS

[Drawing 1]



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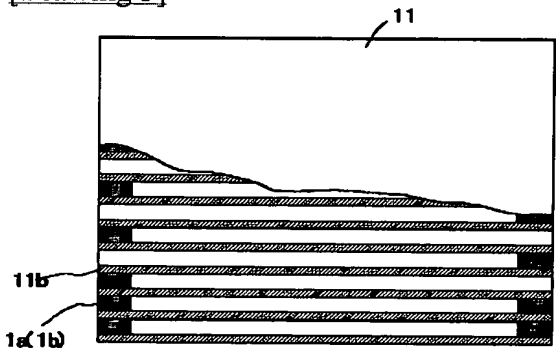

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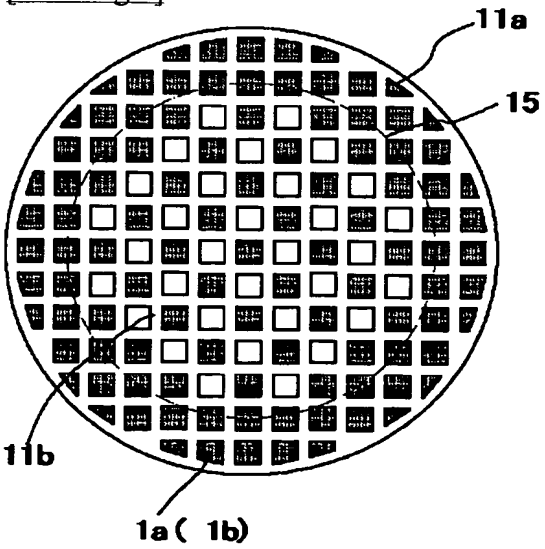
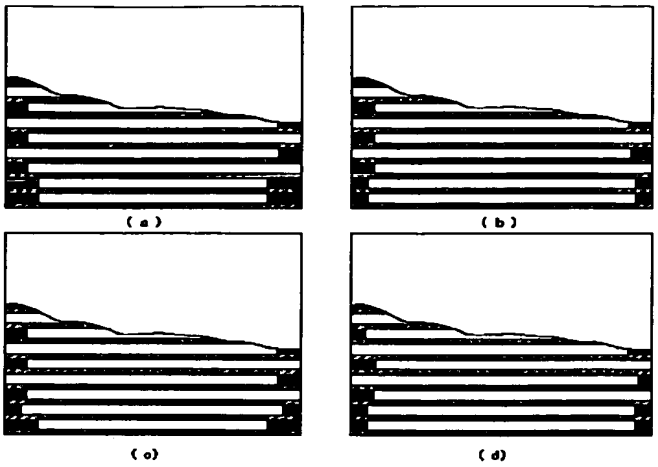


[Drawing 4]



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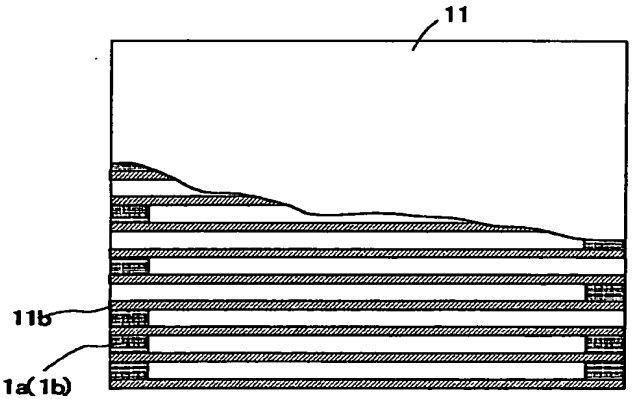
(54)【発明の名称】　セラミックハニカムフィルタ

(57)【要約】
【課題】　再生時の微粒子除去が高効率で行え、且つ低圧力損失の特性を有するセラミックハニカムフィルタを提供することにある
【解決手段】　セラミックハニカム構造体の所定の流路端部を目封止し、該流路を区画する多孔質の隔壁に排気ガスを通過せしめることにより、排気ガス中に含まれる微粒子を除去するセラミックハニカムフィルタにおいて、外周壁近傍の流路が両端部において目封止材で目封止され、前記目封止材のフィルタ端面からの長さがセラミックハニカムフィルタの全長の８．２％以下であり、且つ、前記両端が目封止されている流路は、ハニカムフィルタ端面の外周壁からハニカムフィルタ端面の中心に向かって、最大５×（隔壁ピッチ）の長さの範囲に存在する流路であることとする。



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【特許請求の範囲】

【請求項１】　セラミックハニカム構造体の所定の流路端部を目封止し、該流路を区画する多孔質の隔壁に排気ガスを通過せしめることにより、排気ガス中に含まれる微粒子を除去するセラミックハニカムフィルタにおいて、外周壁近傍の流路が両端部において目封止材で目封止され、前記目封止材のフィルタ端面からの長さがセラミックハニカムフィルタの全長の８．２％以下であり、且つ、前記両端が目封止されている流路は、ハニカムフィルタ端面の外周壁からハニカムフィルタ端面の中心に向かって、最大５×（隔壁ピッチ）の長さの範囲に存在する流路であることを特徴とするセラミックハニカムフィルタ。

【請求項２】　前記外周壁近傍の流路を両端部で目封止した目封止材の端面からの長さがセラミックハニカムフィルタの全長の３．３％以下であることを特徴とする請求項１に記載のセラミックハニカムフィルタ。

【請求項３】　前記両端が目封止されている外周壁近傍の流路は、ハニカムフィルタ端面の外周壁からハニカムフィルタ端面の中心に向かって、最大３×（隔壁ピッチ）の長さの範囲に存在する流路であることを特徴とする請求項１乃至２に記載のセラミックハニカムフィルタ。

【請求項４】　前記セラミックハニカムフィルタの外周壁は、厚さが０．３～２．０ｍｍであり、コージェライト粒子と、それらの間に存在するコロイダルシリカとから構成されていることを特徴とする請求項１乃至３記載のセラミックハニカムフィルタ。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、例えば、デイーゼルエンジンから排出される排気ガスから微粒子を取り除くセラミックハニカム構造体に関するものである。

【０００２】

【従来の技術】地域環境や地球環境の保全面から、自動車などのエンジンから排出される排気ガスに含まれる有害物質の削減が求められ、特に最近は、デイーゼルエンジンからの排気ガス中に含まれる微粒子を除去するために、ハニカム構造体の所定の貫通孔端部を排気ガスの流入側または流出側で交互に目封止したハニカム構造体からなるセラミックハニカムフィルタが使用されている。

【０００３】図１は、排気ガス中の微粒子、特に黒鉛微粒子を捕捉するセラミックハニカムフィルタの使用例の一例を示す要部の模式断面概略図である。通常セラミックハニカムフィルタ１１の端面外周の形状は略円形状で、その外周壁１１ａとこの外周壁１１ａの内周側に各々直交する隔壁１１ｂにより形成された複数の流路１１ｃを有し、この流路１１ｃの両端部が交互に流入側封止材１ａ、流出側封止材１ｂで封止されている。このセラミックハニカムフィルタ１１は、図１に示すように金属

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製収納容器１２内に、支持部材１４を介して圧着把持され、また、支持部材１３を介して貫通孔方向に挟持され、収納されている。ここで、支持部材は一般に金属メッシュ或いはセラミックス製のマットで形成されるが、使用条件に応じて併用される。このような構造のセラミックハニカムフィルタでの排気ガス浄化作用は以下の通り行われる。先ず、流入側排気ガス２ａは収納容器１２に収納されたセラミックハニカムフィルタ１１の流入側端面の開口している流路１１ｃから流入し、矢印で示すように、隔壁１１ｂを通過し流出側排気ガス２ｂとして排気される。流入側排気ガス２ａが隔壁１１ｂを通過する際に、流入側排気ガス２ａに含まれる微粒子は、隔壁１１ｂに捕捉され、浄化された排気ガスが流出側排気ガス２ｂとして、大気中に放出される。隔壁１１ｂに捕捉された微粒子は一定量以上になるとフィルタの目詰まりが発生するため、バーナーや電気ヒーターにより燃焼させ、フィルタの再生が行われる。

【０００４】上述のセラミックハニカムフィルタを金属製収納容器内に収納するための支持部材からの締め付け圧力により生じる、セラミックハニカムフィルの欠けや割れの問題を解決するため、特公平１－４７２０６号公報では、支持部材が当接する位置のセラミックハニカムフィルタの外周縁部の流体通路を充填材で充填したり、開口端面部を充填材で充填することによって、強度を改善したセラミックハニカムフィルタが開示されている。また、特公昭６３－２８８７号公報では、開口端部における所定の位置の貫通孔を特定のセラミック材料で封止し、かつ外周壁近傍の開口端面の貫通孔を少なくとも一方の端面で封止する開口端面封止方法が開示されている。

【０００５】一方、フィルタ再生の際に、金属製収納容器１２から微粒子の燃焼熱の放散を防ぎ、フィルタ再生を良好に行わせる目的で、実開昭６０－１５９８１３号公報、実開昭６２－１０５３２０号公報、実開昭６３－２８８２０号公報、実開昭６４－１２６１４号公報、特開平５－１１８２１１号公報には、外周部に存在する各流路の両端部を目封止材により目封じし、該流路を保温空間とする技術が開示されている。

【０００６】

【発明が解決しようとする課題】しかしながら、上記従来の技術に開示されている開口端面封止方法では、以下に示すような問題点があった。特公平１－４７２０６号公報では、支持部材が当接する位置のセラミックハニカムフィルタ外周縁部の流体通路を充填材で充填していることから、セラミックハニカムフィルタの外周縁部の熱伝導性が良好となるが、外周壁は支持部材を介して金属製容器と接触し冷却されやすい構造となっているため、排気ガス中の微粒子を燃焼させる際に、充填材、外周壁を介して燃焼熱が金属製容器へ伝わりやすく、フィルタ中心部と外周部の温度勾配が過度に大きくなって熱歪に

よりフィルタの割れを招いたり、外周部での微粒子の燃焼除去が不完全となり耐久性や実用性の観点から好ましくなかった。また、特公昭６３－２８８７５号公報では、外周部強化のため外周壁近傍の開口端面を封止している目封止材の長さが、第４図によればハニカム構造体の全長の約１０％であり、また実施例でも全長１５２ｍｍのハニカム構造体に対して、目封止部の長さは１５～２５ｍｍ(全長対比９．９％～１６．４％)であり、封止部の長さが全長に対して相対的に長いことから、排気ガス中の微粒子を燃焼させる際の燃焼熱がこの封止部を介して金属製容器へ放散され易くなるため、フィルタ中心部と外周部の温度勾配が過度に大きくなって熱歪によりフィルタの割れを招いたり、外周部での微粒子の燃焼除去が不完全となり耐久性や実用性の観点から好ましくなかった。また、実開昭６０－１５９８１３号公報、実開昭６２－１０５３２０号公報、実開昭６３－２８８２０号公報、実開昭６４－１２６１４号公報に記載されている外周部に存在する各流路の両端部を目封止材により目封じし、該流路を保温空間とする技術では、目封止材の長さについては何ら記載がないことから、特公昭６３－２８８７５公報と同様に、排気ガス中の微粒子を燃焼させる際の熱エネルギーが目封止部を介して金属製容器へ放散され易くなり、フィルタの割れを招いたり、外周部での微粒子の燃焼除去が不完全となる場合があった。また、外周近くで両端が目封止された流路の数については、何ら記載がないことから、フィルタ機能を有する流路が実質的に減少し、フィルタの圧力損失が上昇するため、エンジン性能が低下するという問題の発生することもあった。また、特開平５－１１８２１１号公報に記載されている、両端を目封止された断熱部の断面積の全断面積に対する割合を示す栓詰率を１０～２０％としたフィルタでは、確かにフィルタ外周部からの金属製容器への熱拡散を防止でき、微粒子を効率よく燃焼除去できるものの、栓詰率が１０～２０％と高いことから、フィルタ機能を有する流路が実質的に減少し、フィルタの圧力損失が上昇するため、エンジン性能が低下するという問題があった。以上のように従来の技術では、外周壁近傍における両端が目封止された流路の断熱特性を利用しているが、再生時の微粒子除去が高効率で行え、しかも低圧力損失という、二つの特性を両立させたフィルタを得ることは、困難であった。

【０００７】本発明の目的は、上記課題に鑑みてなされたもので、再生時の微粒子除去が高効率で行え、低圧力損失の特性を有するセラミックハニカムフィルタを提供することにある。

【０００８】

【課題を解決するための手段】本発明者らは、セラミックハニカムフィルタの外周壁近傍の流路の断熱性及び隔壁の微粒子捕集特性に注目し、鋭意検討した結果、上記課題が解決できるとの知見を得、本発明に想到した。すなわち、本発明のセラミックハニカムフィルタは、セラミックハニカム構造体の所定の流路端部を目封止し、該流路を区画する多孔質の隔壁に排気ガスを通過せしめることにより、排気ガス中に含まれる微粒子を除去するセラミックハニカムフィルタにおいて、外周壁近傍の流路が両端部において目封止材で目封止され、前記目封止材のフィルタ端面からの長さがセラミックハニカムフィルタの全長の８．２％以下であり、且つ、前記両端が目封止されている流路は、ハニカムフィルタ端面の外周壁からハニカムフィルタ端面の中心に向かって、最大５×（隔壁ピッチ）の長さの範囲に存在する流路であることを特徴とする。このとき、前記外周壁近傍の流路を両端部で目封止した目封止材の端面からの長さはセラミックハニカムフィルタの全長の３．３％以下であることが好適である。また、前記両端が目封止されている外周壁近傍の流路は、ハニカムフィルタ端面の外周壁からハニカムフィルタ端面の中心に向かって、最大３×（隔壁ピッチ）の長さの範囲に存在する流路であることが好適である。また、前記セラミックハニカムフィルタの外周壁は、厚さが０．３～２．０ｍｍであり、コージェライト粒子と、それらの間に存在するコロイダルシリカとから構成されていることが好適である。

【０００９】

【作用】本発明における作用効果について説明する。本発明のセラミックハニカムフィルタは、外周壁近傍の流路が両端部において目封止材で目封止され、前記目封止材の端面からの長さをセラミックハニカムフィルタの全長の８．２％以下、且つ、前記両端が目封止されている流路は、ハニカムフィルタ端面の外周壁からハニカムフィルタ端面の中心に向かって、最大５×（隔壁ピッチ）の長さの範囲に存在する流路としている。このため、フィルタ外周壁から金属製容器の熱放散がなく、捕集された微粒子を効率よく燃焼除去でき、フィルタ再生率に優れている。更に、フィルタの圧力損失を最小限に押さえることができ、エンジン性能の低下を招くこともない。すなわち、流路の両端部を目封止している目封止材の端面の長さをフィルタ全長の８．２％以下としていることから、微粒子燃焼時の燃焼熱の目封止材を介しての金属製容器へ放散が無視できる程度に押さえることが可能になる。ここで目封止材の端面の長さがフィルタ全長の８．２％を越えると、微粒子燃焼時の燃焼熱の目封止材を介しての金属製容器へ放散が無視できなくなり、捕集された微粒子をの燃え残りが生じ、フィルタ再生率が低下する。また、両端が目封止されている流路が、ハニカムフィルタ端面の外周壁からハニカムフィルタ端面の中心に向かって、最大５×（隔壁ピッチ）の長さの範囲に存在する流路としていることから、フィルタの圧力損失を最小限に押さえることができる。ここで両端が目封止されている流路が、ハニカムフィルタ端面の外周壁からハニカムフィルタ端面の中心に向かって、最大５×（隔

壁ピッチ）の長さの範囲を越えると、相対的にフィルタ機能を有する隔壁の割合が少なくなることから、フィルタの圧力損失が上昇するため、エンジンの排圧が上昇し、エンジン性能の低下を招く。

【００１０】さらに、外周壁近傍の流路を両端部で目封止した目封止材の端面からの長さがセラミックハニカムフィルタの全長の３．３％以下とすることにより、外周部近傍の流路が断熱空気層として働く効果が大きくなり、フィルタ外周壁から金属製容器の熱放散が更に少なくなり、捕集された微粒子を効率よく燃焼除去でき、フィルタ再生率が更に優れるようになる。

【００１１】また、前記両端が目封止されている外周壁近傍の流路を、ハニカムフィルタ端面の外周壁からハニカムフィルタ端面の中心に向かって、最大３×（隔壁ピッチ）の範囲に存在する流路であるとすることにより、フィルタの圧力損失を更に低減できるため、エンジンの排圧が低下し、エンジン性能が更に向上する。

【００１２】また、セラミックハニカムフィルタの外周壁が、厚さが０．３～２．０ｍｍであり、コージェライト粒子と、それらの間に存在するコロイダルシリカとから構成されていることが好適であるのは、該外周壁において、両端面を目封止された外周壁近傍の流路の断熱効果がいっそう有効になるからである。外周壁の厚さは、厚い方が断熱性からは好ましいが、２．０ｍｍを越えると、フィルタに熱衝撃が加わった際に外周壁の割れが発生しやすなり、また０．３ｍｍ未満では、断熱効果は得られないことから、０．３～２ｍｍの範囲が好ましい。また、外周壁がコージェライト粒子と、それらの間に存在するコロイダルシリカとから構成されていると、外周壁がコージェライトセラミックス単独で構成されている場合に比べて、外周壁内におけるコージェライトの連続性が損なわれるため、熱が伝わりにくく、外周壁での断熱効果が更に改善されるからである。ここで、コージェライト粒子を使用するのは、熱膨張係数が小さく、耐熱衝撃に有利なためであり、一般に５０μｍ以下の平均粒径を有する焼成粉末である。またコロイダルシリカを使用するのはコージェライト粒子を結合して耐熱性を有する外周壁を形成するためである。外周壁には上記コージェライト粒子とコロイダルシリカ以外にも、耐熱性や強度を損なわない範囲で、セラミックファイバー、水ガラス、アルミナセメント、コロイダルアルミナ等を適宜添加しても良い。

【００１３】

【００１４】

【発明の実施の形態】以下、本発明を実施の形態により説明する。図２に本発明によるセラミックハニカムフィルタの端面の模式図を示す。また、図３に本発明によるセラミックハニカムフィルタの流路方向の断面模式図を示す。仮想線１５は外周壁に対して端面中心に向かって２×（隔壁ピッチ）の長さだけ小さい輪郭を示し、仮想線１５と外周壁との間に存在する流路は両端で目封止されている。ここで、目封止材の流路への充填は、公知の技術、例えば、目封止材スラリーを準備した後、ハニカム構造体の流路における一端側の所定の開口端部を樹脂製マスクにより閉塞し、当該ハニカム構造体の一端側に所定の深さが得られるようにスラリーを浸積し、スラリーが乾燥した後に、樹脂製マスクを除去し、さらに目封止材の焼成を行うことにより行われる。ここで本発明の実施の形態は図２乃至３の形状に限定されるものでなく、例えば、両端部で目封止された流路の目封止長さが、セラミックハニカムフィルタの全長の８．２％を越えない範囲で、且つ、前記両端が目封止されている流路は、ハニカムフィルタ端面の外周壁からハニカムフィルタ端面の中心に向かって、最大５×（隔壁ピッチ）の長さの範囲に存在する流路であれば、図４に示す他の発明例の形状でも、外周壁近傍で両端を目封止された流路が断熱空気層として働くため、フィルタ外周壁から金属製容器の熱放散がなく、捕集された微粒子を効率よく燃焼除去できると共に、フィルタの圧力損失を最小限に押さえることができるため、エンジン性能の低下を防ぐことができる。

【００１５】また、本発明のセラミックハニカムフィルタを構成する材料としては、本発明が主としてディーゼルエンジンから排出される排ガスを対象とするため、耐熱性の良い材料を使用することが好ましい。このためコージェライト、ムライト、アルミナ、窒化珪素、炭化珪素、LAS等を主結晶相とするセラミック材料を用いることが好ましいが、中でもコージェライトを主結晶相とするセラミックハニカムフィルタは、安価で耐熱性に優れ、化学的にも安定なため最も好ましい。

【００１６】また本発明のセラミックハニカムフィルタは従来技術で示したように交互再生方式に適用できるのは勿論のこと、貴金属触媒との組合せにより微粒子を連続的に燃焼させる、連続再生式のセラミックハニカムフィルタに適用できることは言うまでもない。

【００１７】（実施例１）コージェライト化原料を混合、混練し、公知の押出成形法によりハニカム構造体を成形した後、１４００℃で焼成を行い、外径２６７ｍｍ、長さ３０５ｍｍ、隔壁の厚さが０．３ｍｍ、隔壁のピッチが１．４７ｍｍ、外周壁の厚さが１．５ｍｍであるコージェライト質セラミックハニカム焼成体を得た。次いで、セラミックハニカム構造体の流路端部を交互に目封止がなされると共に、外周壁近傍の流路に対しては両端部が目封止されるように公知の技術により、コージェライト化原料からなる目封止材スラリーを充填した後、目封止材スラリーの乾燥、焼成を行い、各種コージェライト質セラミックハニカムフィルタを得た。この際、外周部近傍の両端を目封止された目封止材の各種長さ及び端面における各種範囲が得られるよう目封止スラリーの充填条件を調整した。これらのセラミックハニカ

ムフィルタに対して、ディーゼルエンジンから排出される微粒子を捕捉させた後、微粒子を燃焼除去した後の質量再生率及び、圧力損失の評価を行った。結果を表１に示す。表１において、両端部目封止部の目封止長さ比とは、（外周壁近傍の流路を両端部で目封止した目封止材の端面からの長さ）×１００／（フィルタの全長）のことであり、本実施例ではフィルタ全長は３０５ｍｍである。また端面における両端目封止部の範囲とは、両端が目封止された流路の存在する範囲を、端面における外周壁からの中心に向かう長さで示したものである。

【００１８】ここで質量再生率とは、（捕捉量－再生後の燃え残り量）×１００／（捕捉量）（％）のことを示す。試験結果は、質量再生率が８０％以上の場合を合格（○）とし、更に９０％以上の好ましい場合を（◎）とし、８０％未満の場合を不合格（×）で示した。一方、圧力損失は、圧力損失テストスタンドにて、空気流量７．５Nm^3／ｍｉｎの時のハニカムフィルタ流入前と流出後の圧力損失で評価を行い、２５０ｍｍＡｑ以下の圧力損失であれば合格（○）とし、更に好ましい２００ｍｍＡｑ以下の場合は（◎）で、２５０ｍｍＡｑを超える圧力損失であれば不合格とし（×）で示した。そして、総合判定として、質量再生率、圧力損失のいずれも合格であるものを（○）、そのうち両者とも（◎）であるものを（◎）、いずれかに（×）があるものを（×）で評価した。

【００１９】表１に示す結果のうち、試験ＮＯ．１～５は、本発明例であり、外周部近傍の流路を両端部で目封止した目封止材の長さがセラミックハニカムフィルタ全長の８．２％以下であり、両端が目封止されている外周壁近傍の流路が、ハニカムフィルタ端面の外周壁から端面の中心に向かって最大５×（隔壁ピッチ）の範囲内にあることから、質量再生率、圧力損失とも（○）或いは（◎）で合格し、総合判定はいずれも合格であった。特に、試験ＮＯ．４は、外周部近傍の流路を両端部で目封止した目封止材の長さがセラミックハニカムフィルタ全長の３．３％以下であり、両端が目封止されている外周壁近傍の流路が、ハニカムフィルタ端面の外周壁から端面の中心に向かって最大３×（隔壁ピッチ）の範囲のより好ましい範囲であることから、質量再生率、圧力損失とも（◎）判定で、総合判定（◎）であった。試験ＮＯ．６～８は、本発明の比較例であり、外周部近傍の流路を両端部で目封止した目封止材の長さがセラミックハニカムフィルタ全長の８．２％を超えていることから、

微粒子燃焼時に、この目封止材を介しての燃焼熱の放散が大きくなり、質量再生率の判定が不合格（×）となり、総合判定は（×）であった。また、試験ＮＯ．９は本発明の比較例で、両端が目封止されている外周壁近傍の流路が、ハニカムフィルタ端面の外周壁から端面の中心に向かって最大５×（隔壁ピッチ）の範囲を超えた領域にも存在することから、外周壁近傍の両端を目封止された流路による断熱効果が大きくなり、質量再生率の判定は（◎）であったが、フィルタ機能を有する流路の数が実質的に減少することから、圧力損失の判定が不合格（×）となり、総合判定は不合格（×）であった。更に、試験ＮＯ．１０は、本発明の比較例で、外周壁近傍に両端部を目封止された流路のないフィルタの例であるが、外周壁近傍の流路による断熱効果が得られないため、質量再生率の判定が不合格（×）となり、総合判定は不合格（×）であった。

【００２０】（実施例２）実施例１と同様の方法により、コージェライト化原料を混合、混練し、公知の押出成形法によりハニカム構造体を成形した後、両端部の所定の流路に目封止を行い、１４００℃で焼成を行い、セラミックハニカム焼成体を得た。その後、この焼成体の周縁部を加工により除去し、加工後の外周面に、平均粒径１５μｍのコージェライト骨材１００質量部に対してコロイダルシリカを１０質量部加え、更にバインダー、水などを加えて調整したコージェライト質スラリーを塗布して外周壁を形成した。その後、外周壁の乾燥、焼成を行い、外径２６７ｍｍ、長さ３０５ｍｍ、隔壁の厚さが０．３ｍｍ、隔壁のピッチが１．４７ｍｍ、外周壁の厚さが１．５ｍｍである、表１の試験ＮＯ．１１、１２に示すコージェライト質セラミックハニカムフィルタを得た。これらに対して実施例１と同様の、質量再生率、圧力損失の評価を行った結果を、表１に示す。試験ＮＯ．１１、１２は、本発明例であり、外周部近傍の流路を両端部で目封止した目封止材の長さがセラミックハニカムフィルタ全長の８．２％以下であり、両端が目封止されている外周壁近傍の流路が、ハニカムフィルタ端面の外周壁から端面の中心に向かって最大５×（隔壁ピッチ）の範囲内にあることから、質量再生率、圧力損失とも（○）或いは（◎）で合格し、総合判定はいずれも合格であった。

【００２１】

【表１】

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試験NO		外周壁近傍の両端目封止流路	両端目封止部の目封止長さ比 (%)	端面における両端目封止部の範囲	評価結果		
					質量再生率	圧力損失	総合判定
1	本発明例	有り	8	4×(隔壁ピッチ)	○	○	○
2		有り	5	4×(隔壁ピッチ)	○	○	○
3		有り	3	4×(隔壁ピッチ)	◎	○	○
4		有り	3	2×(隔壁ピッチ)	◎	◎	◎
5		有り	5	2×(隔壁ピッチ)	◎	◎	○
6	比較例	有り	12	2×(隔壁ピッチ)	×	◎	×
7		有り	15	2×(隔壁ピッチ)	×	◎	×
8		有り	50	2×(隔壁ピッチ)	×	◎	×
9		有り	3	7×(隔壁ピッチ)	◎	×	×
10		無し	−	−	×	◎	×
11	本発明例	有り	3	2×(隔壁ピッチ)	◎	◎	◎
12		有り	5	2×(隔壁ピッチ)	◎	◎	○

【００２２】以上、本発明につき、実施の形態及び、実施例１～２をもとに説明したが、本発明は上記発明例に限定されず、技術思想の範囲で応用可能である。例えば、セラミックハニカム構造体の外周形状は、円形でなくとも、楕円など他の形状にも適用可能である。

【００２３】

【発明の効果】以上詳細に説明のとおり、本発明のセラミックハニカムフィルタは、フィルタの外周壁近傍に両端を目封止材で目封止した流路を設けており、しかもこの目封止材の長さ、端面における存在する範囲を詳細に規定しているため、フィルタ外周部からの放熱がほとんどなく、捕集された微粒子を効率よく燃焼除去でき、フィルタの再生特性が優れている。更に、フィルタの圧力損失を最小限に押さえることができ、エンジン性能の低下を防ぐことができる。

【図面の簡単な説明】

【図１】従来のセラミックハニカムフィルタの一例の断面模式図である。

【図２】本発明のセラミックハニカムフィルタの一例の端面の正面図である。

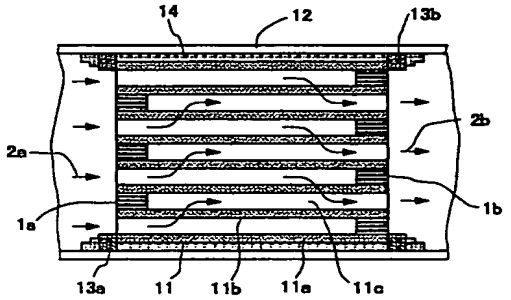
【図３】本発明のセラミックハニカムフィルタの一例の模式概略断面図である。

【図４】本発明のセラミックハニカムフィルタの他の例の模式概略断面図である。

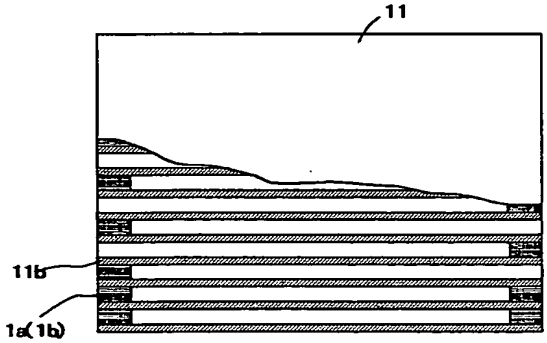
【符号の説明】

１ａ　流入側目封止材
１ｂ　流出側目封止材
２ａ　流入側排気ガス
２ｂ　流出側排気ガス
１１　セラミックハニカムフィルタ
１１ａ　外周壁
１１ｂ　隔壁
１１ｃ　流路
１２　収納容器
１３ａ、１３ｂ　支持部材
１４　支持部材

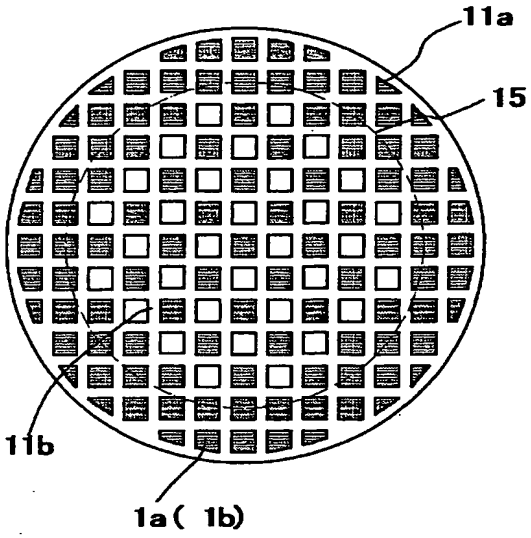
【図１】



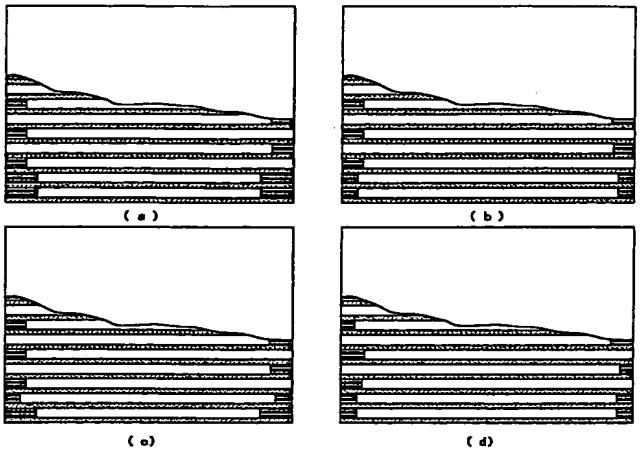
【図３】



【図２】



【図４】



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